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ABSTRACT

A study of computer facilities in British libraries highlighted the respective benefits and disadvantages of using the parent institution's central computer or using a dedicated minicomputer. The large computer's technical advantages include greater opportunities for sharing or buying operational software, and the availability of experienced staff. The maintenance problems are not for the library to solve. The computer is capable of handling the large sorts and large files characteristic of library processing. Greater availability of higher level languages speeds up the development of a system and aids the unavoidable change to new equipment. With a minicomputer the library has control over access, is independent of the idiosyncrasies of the computer center, and is secure for the life of the equipment. The system will be tailor-made for the library but capable of expansion. In exchange for these benefits, the library has the responsibility of selecting, financing, operating, and maintaining the system. (Author/PF)

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Why use a minicomputer? Some factors affecting their selection*

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ABSTRACT

Based on data gathered from libraries visited, factors influencing the selection of computer facilities are explored. Comparison is made between costs associated with in-house mainframes and minis. Selection policy in academic, public and special libraries is examined. Other factors considered include staffing, software, hardware selection. Advantages and disadvantage between mainframes and minis are summarised in the conclusion.

Before considering the question 'why use a minicomputer' I should like to make quite clear why, since I am not as yet a minicomputer user, I agreed to speak at a session originally entitled 'The Politics of Library Automation' which is a much more emotive title than the present one. That title gave me a platform on which to consider a situation, the existence of which I first became aware while working in the Aslib Research and Development Department on the project ambitiously called "Modes and types of computer provision in British libraries". That situation revolves around the fact that politics are an important factor in selecting a computer facility.

When the libraries we visited were deciding to computerize, the major factor in the selection of type of computer to be used was rarely a clear-cut financial, best value for money decision. The selection of computer facilities is often determined by the structure and policy of the organisation of which the library is a part, the facilities and personnel of that organisation's computer centre and assumed institutional policy. I intend to explore here some of the factors which influence the selection of the mode and type of computer provision.

By type of computer provision I mean that type of processing, most frequently being batch or on-line, mini or main-frame, and by mode I mean the organisation of the computer: a shared facility operated by the library's parent institution, a library-dedicated computer, a service bureau, or a library cooperative which provides a computer-based service to libraries. In fact the decision of which mode and type to use is further complicated by the fact that for any one application a library may decide to use a combination of modes and types of computer provision. Where a mini is used, this is frequently the case.

In the *Directory of operational computer applications* of 1973 [1] it can be seen that most operational systems were batched main-frame applications being processed on an in-house shared computer. The Aslib project team followed up some of the entries representing a variety of approaches for

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further interviews, and attempted to find out what alternatives had been considered, the factors that had made a choice successful or less than successful and the factors that had been used to justify the decision to computerise a library activity. In the past few libraries even considered using anything other than their institutional main-frame computer. We found some exemplary feasibility studies had been carried out but in 1973 few considered any alternative computer facilities. One industrial librarian interviewed had been using a service bureau computer, a situation which had arisen at a time when the company had no computer but the service bureau had a set of programs which suited the library's needs. When we visited, after several years of successful operation, the library was under pressure "to come in-house" for which they would be charged more despite the company computer having spare capacity. While this may be an extreme case, it is not extreme to say that most librarians assumed that using the institutional main-frame was the cheapest alternative and did not question it.

CHARGING POLICIES

In-house computer centre charges cause difficulties. Often no actual charge is made to the users of an institutional computer, but an internal accounting unit is assigned to the library's budget. This is a method of allocating computer centre resources among departments. In these circumstances it is difficult to know how to compare the internal notional charge for use of the main-frame with the cost of purchasing a library-dedicated mini. The commonly recommended [6] ratio of the cost of purchase of the mini being equal or less than the estimated charge for three years is difficult or impossible to apply with notional charges. Even where a real charge is made, we frequently heard the view expressed in one form of words or another that it is easier to use in-house facilities however inappropriate than to obtain funds to buy equipment or hire outside services.

In the case of the Birmingham Libraries Co-operative Mechanisation Project, the team had begun with this assumption, but they found that when their participating organisation's computer facilities provided a charging rate, it became cheaper to use a bureau which had a computer better suited to the needs of a large scale cataloguing scheme [2].

Some apparent reasons for pressure to use the existing in-house main-frame include:

1. Management pressure to utilize fully existing equipment even if it is not the most appropriate equipment for an individual application. Frequently neither management nor the librarian could judge the suitability, or lack of it, of equipment for library applications.

2. A strong computer manager who realizes library applications can justify a larger computer.

3. Fear of loss of control over cost in the case of bureau or cooperative.

4. Fear of the unknown with bureau and mini with regard to servicing, reliability and security.

If it is frequently easiest to decide to use an in-house computer, the next line of approach to computer usage is to make a capital investment rather than to commit the library to a continuing outlay whether that outlay be salary for additional staff, subscribing to a co-operative or for bureau use. The advent of mini-computers has brought the capital cost of a computer down to a level where it can be compared to manual library activities thus changing radically the nature of feasibility studies.

Indeed carrying out a feasibility study comparing use of an in-house main-frame, a library dedicated or shared mini, the use of a bureau or joining a library cooperative is a challenge. I would like to consider some of the factors other than pressure from within the library's parent organisation, which may affect the decision to use a mini. One of those factors is institutional policy.

INSTITUTIONAL POLICIES

When expressing our results, institutional groupings were found to be useful when considering institutional policies which affect selection of computer provision. Here I shall use the traditional institutional groups: academic, local authority and industrial/special libraries.

1. Policy affecting academic libraries

The research computers in universities are funded by the Computer Board which has never given libraries the "right" to use their equipment [3]. The decision is left to the computer manager who usually allows the library access when spare capacity is available on the machine, for instance when it is new. But as the academic staff learn how to incorporate computer usage into the syllabus and as researchers learn computer techniques the spare capacity disappears leaving the library in a difficult position, especially it is a cataloguing application. Many universities have administrative computers for payroll, student records and other data processing applications, but while reasonably suitable for circulation systems and periodicals lists, they are frequently too small to be suitable for large scale cataloguing systems. Right of access is not the problem it is with research computers but priority of access is. Circulation systems suffer in this respect since they need at least dai., processing. This combination of factors has attracted university libraries to the 'hybrid' approach, as attempted at Bath, Lancaster, East Anglia, Manchester and Surrey to name only a few.

These 'hybrid' systems are characterized by their attempts to optimize the use of the main-frame while bringing those functions requiring user control over the computer facility under the library's jurisdiction. Administrative main-frame computers, even if they have on-line access during the day, are rarely available for the long hours required by the library's issue system, making circulation control an ideal 'hybrid' application combining mini and mainframe.

2. Policy affecting public libraries

In local authorities, the systems/programming staff are always part of the

computer facility rather than the library staff, unlike some university environments.

The large computer housekeeping projects tend to be located in authorities where the library has been used to justify the mode of computer provision for the authority. Both Cheshire County and West Sussex County Council have large IBM on-line systems where the library is a major user. In both cases a systems analyst has virtually moved into the library.

Public libraries also tend to use the 'hybrid' approach as well, even though the computers to which they have access may have sufficient capacity. It may be that high priority is given to linking branches on-line such as at Havering, to facilitate reservations and inter-branch use: there the mini then serves as alternative to the main-frame being on-line to the libraries. The need for access during evening hours and on Saturday helps justify the capital outlay for a mini.

There may be other reasons why independence from the Council's computer department is desirable. Some of these are generally applicable and I shall discuss them later.

3. Factors affecting special libraries

In special libraries the initiative for computer usage usually comes from the library rather than the computer side but in big multi-division organisations like Unilever and ICI, libraries have stimulated one another by sharing expertise on programs. In-house use of the company main-frame has characterized the special library area which has mainly been concerned with cataloguing and indexing applications. It is noteworthy that in 1973 the only use of a mini-computer in the special library area was a research association which did not have its own main-frame and had someone on the library staff who had the technical expertise to develop the whole system. Since minis are economic for cataloguing and indexing only when large amounts of data entry are involved a la Camden, special libraries are not likely to be frequent mini-users. I would surmise that in special libraries, the main users of minis will be those which do not have access to an institutional main-frame. A few academic libraries, like Manchester Business School, may fit into this category as well and although a 'hybrid' approach is less likely, a mini shared with other departments of the institution is likely to be an attractive solution.

OTHER FACTORS TO BE CONSIDERED

Staffing

Computer expertise in helping to develop a library application is an important factor. If the computer centre cannot provide the right people to prepare the library's application for the main-frame and if it is difficult to obtain library staff with the necessary skills either to utilize the available main-frame or to develop a mini system then the answer may be to join an operational co-operative such as BLCMP. This also circumvents the problem of dealing with an unknown, as library staff can see beforehand the system in operation.

Increasing participation in BLCMP and in the US in the Ohio Colleges Library Centre illustrates the attractiveness of this approach as does the interest in British Library services. These tend to be available mainly for cataloguing applications.

In general, to implement a mini-computer system requires staff willing and enthusiastic to move into a new area of technical competence. Programmers and analysts experienced in using main-frame computers are not difficult to find if a competitive salary is offered; library staff and library schools have become familiar with main-frame techniques. In staffing, mini's do present a certain risk and challenge.

Independence from the computer centre

If first generation library applications utilized the in-house main-frame, it may be significant that several second-generation library systems are leading the development of mini-computer applications (Camden, IEA, Manchester University, Bath University to name a few). Is it because they value independence from the computer centre which they have found in some way inadequate or is it because they have developed confidence in their ability to exploit the machines themselves? Perhaps it is a combination of both.

Certainly the priority given to the library's processing requirements is a major factor in the relationship between library and computer centre. This is almost as important as the suitability of the computer for library processing. Strikes by computer operators in large centres have been found to be an effective bargaining tool. Camden and East Anglia both kept their minis in operation when the main computer centre was down.

Technical considerations: software

Increasing availability of tested software lessens the risks involved in implementing in-house operations. Rau said in 1972 [4] that "assuming benefits for a particular application are equal regardless of whether a stand-alone mini, a time-sharing service, a service bureau or a large computer is used, the effect on profit can be maximized only by reducing either the development or production cost or both". Certainly more opportunities exist for sharing systems design and/or programs if a main-frame is used, particularly if that main-frame is an IBM System 360/370 or an ICL 1900 series or 2900 series, and a high level programming language is used.

Selecting the manufacturer

Technical problems like equipment selection, finance and maintenance, while significantly less than for a main-frame, become the responsibility of the library. Gosch gives some excellent, readable advice to librarians entering this area which I shall not repeat [5]. While computer staff or special library staff deal with these problems on a day-to-day basis, the chief librarian has to take ultimate responsibility, a job for which he probably feels ill-equipped. Some problems that have to be faced are the reliability of the manufacturer, supply time, mean times between breakdown, maintenance arrangements,

tendering arrangements and cost comparisons, financing arrangements (lease, hire or buy). There are no clear cut best answers so the experience of other users becomes important. Use of outside consultants could be especially advantageous in this area.

Suitability of the application

Weitzman, in his excellent introduction to the mysteries of minicomputers, points out that the minicomputer is 'generally cost-effective in terms of relatively light but evenly distributed workloads, while the large in-house data processing facility . . . may be the preferred approach where data processing requirements are infrequent and vary greatly in job size' (6). In library applications the data collection involved in circulation control and in the order/catalogue procedures in a large library involves relatively light but fairly evenly distributed work-loads but printing of overdue notices and sorting, merging and producing catalogues are the sorts of job for which a main-frame is more desirable because of its wider range of peripheral equipment, such as high speed magnetic tape equipment, larger central processing units and much larger core storage facilitating sorting and file-handling. In addition the larger numbers of high level languages like COBOL and PL/I available on main-frames are attractive for the complicated manipulation required in catalogue production. Certainly high-level languages ease programming, speeding production of an operational system. Some of the larger minis do offer high-level languages but their cost is higher too, requiring a larger application to justify dedicated equipment.

CONCLUSION

Since the strong points of the mini tend to be weak points of the main-frame, a look at the benefits of each may be a useful way to conclude.

The main-frame's technical advantages include greater opportunities for sharing or buying operational software, experienced staff are more readily available. The maintenance problems are not for the library to solve. They are capable of handling large sorts and large files characteristic of library processing. Greater availability of high-level languages speeds up the development of a system, amending it as requirements change, and aids the unavoidable change to new equipment.

The problems of using a main-frame which make minis an attractive consideration may arise because the main-frame does not provide access of a desired nature: it may not be on-line: the equipment may not be suitable for library purposes, the computer department may not be library user oriented, resisting variable-length catalogue records, frequent processing of the loans file and may not give security of right or priority of access. Charges may be subject to change.

With a mini, the library has control over access, is independent of the idiosyncrasies of the computer centre, and is secure for the life of the equipment; the system will be tailor-made for the library but capable of expansion. For

these benefits the library has the responsibility of selecting financing operating and maintaining the system. So I leave you with the further question: how important are these benefits in your library's environment?

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